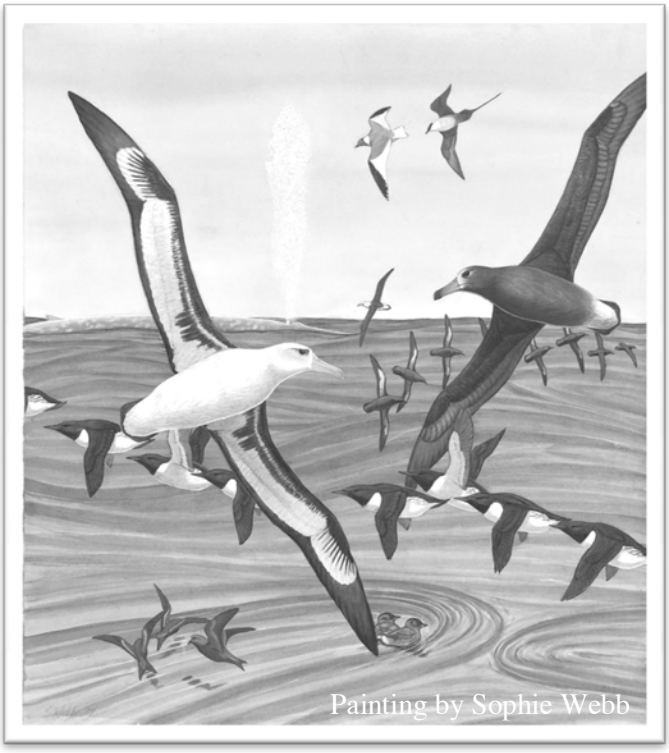
Lesson 1: Introduction to Seabirds

Name: _____ **Date:** _____

Engage

Flights at Sea

We are all familiar with birds. These animals are found in many earth habitats, from the poles to the tropics, deserts to lush rainforests, and even towns and cities. Did you know that there are many species of birds that spend most of their lives at sea? This information is not that surprising, when you consider that 71% of the Earth's surface is covered by ocean, and that the ocean contains 97% of all of the water on the planet. The ocean is considered to be Earth's "final frontier" in terms of scientific exploration, because there is still so much for us to learn about the ocean, its features, and the creatures that depend on its habitats.



Albatross are one the largest and most beloved seabirds. In the Pacific Ocean, Laysan (left) and Black-footed (right) Albatross search the oceans for food, sometimes alone, and sometimes feeding in flocks with other seabirds.

This lesson will focus on two species of **seabirds,** birds that depend mostly on the ocean for their survival. The two species are the **Black-footed Albatross** (Hawaiian name: *ka'upu*) and the **Laysan Albatross** (*mōlī*). Both species are found throughout the Pacific Ocean, including near the Hawaiian Islands and California. From the tracking maps, you saw that these majestic birds travel thousands of miles. In a jet plane, which travels around 500 miles per hour, it takes roughly 5 hours to fly from California to Hawai'i. Powered by only their bodies and the wind, these birds cover the same distance in a matter of days flying over 80 miles per hour. In this lesson, we will learn more about these species and the unique features that allow them to fly thousands of miles at a time.

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Explore

Sophie Webb

A bird's **wingspan** is described as the distance from the tip of one wing to the tip of the other. By measuring the distance from our fingertips to fingertips with arms outstretched, we can compare our "wingspan" with that of albatross.

Work with a partner or in a group of three for this activity. Follow the instructions and record your data in the data table provided.

1. One partner should stand with arms outstretched.
2. Another partner should measure the distance, in centimeters from the farthest fingertip to farthest fingertip. Record the measurement in the data table.
3. Next, measure the height, in centimeters of each partner, and record the measurements in the data table.
4. Repeat this process for the other partner(s).

Bird or Student	Wingspan Measurement	Length or Height	Ratio of Wingspan to Body Size
Black-footed Albatross	200 centimeters (typical)	70 centimeters (typical)	2.85
Laysan Albatross	215 centimeters (typical)	71 centimeters (typical)	

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5. Find the ratio of wingspan to body length/height for each albatross and student and record your findings in the data table. To do this, divide the wingspan by the body length/height. The first one, Black-footed albatross, is done for you:

$$\frac{100\,cm}{70\,cm} = 2.85$$

6. How do human wingspans compare to albatross wingspans?

_____

_____

_____

7. Why do you think albatross wingspans matter?

_____

_____

_____

Explain

The following passage accompanies the slideshow that your teacher will show you.

Albatross Life Cycles

Laysan and Black-footed Albatross are known to live, or have a **lifespan** of, up to 60 years or more. Birds typically begin mating between 6–12 years of age. The majority of albatross in Hawai'i nest on sandy islands among the Northwestern Hawaiian Archipelago, or *Kūpuna* Islands. Most birds return to the same colony every year and nest at or near their former sites. Albatross attempt to mate for life, forming a strong pair bond that is typically only broken if one partner dies. Upon finding one another on their nesting island around October, albatross mates perform a dance for one another.

Laysan Albatross parent with its newly hatched chick.

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These animals reproduce sexually; sperm and egg meet within the female's reproductive organ (oviduct). Females produce one egg a season, sometime skipping a year, usually in November or December. Both parents take turns incubating the egg for about 2–3 months, and then the chick finally hatches in January or February.

8. Upon hatching, the chick must be fed. Parents take turns feeding the chick. To do so, they must fly out to sea to collect food items, which are then regurgitated into chicks' mouths. The chicks grow, and both parents continue to care for and feed them for several months. In late June and July, the chicks take off, or **fledge.** These young chicks are called **fledglings** and now spend all their time at sea, soaring above the waves and never touching land for 3–5 years when they return to learn how to find a mate, dance, and nest. Draw a series of sketches that illustrate the typical albatross life cycle. Include the following:

    a. Relevant times of year and number of years

    b. Locations in which albatross are found during these times

    c. Other interesting information

The following passage accompanies the slideshow that your teacher will show you.

> *"I now belong to a higher cult of mortals, for I have seen the albatross!"*
> *– Robert Cushman Murphy, American ornithologist*

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Meeting Needs at Sea

All living things must somehow get energy and nutrients. Albatross find their food at sea. These birds have a strong sense of smell, made possible by tubular nostrils and a large lobe in the brain for smelling (olfactory lobe). This is an unusual ability for birds. In fact, albatross belong to a family of birds known as tubenoses. Albatross eat fish eggs, squid, fish, and other items near the surface of the water. They also have webbed-feet, perfect for life on the sea surface. Albatross drink seawater. Unlike humans, they can survive just fine with this liquid, thanks to a special glad that removes excess salt in form of saline that drips out their tubenoses and off their bills.

Observing a flying albatross is quite a sight! They gracefully glide on sea surface wind, and can actually lock their "elbows and shoulders" to keep their wings stiff, ideal for catching the wind. The muscles and bones in their wings work together for flapping, but they also have special tendons and other tissues that keeps the wings outstretched. These features also allow them to soar without expending much muscle energy. Their heart rates while flying are close to their resting heart rates. Think about what your heart rate is like when running, as compared to lying on the couch watching television. In fact, the most difficult part of their long journeys is often getting started. These birds take a running start, with outstretched wings to catch the wind.

Albatross species take advantage of sea surface winds, using a technique in which the wind lifts them and then they rapidly glide downward. This flying technique is known as **dynamic soaring**, and allows albatross to fly huge distances. In calm weather, albatross often rest on the sea surface until the wind increases enough to fly efficiently.

Albatross and Adaptations

An **adaptation** is a genetically programmed feature that improves an individual's chances for survival and/or reproduction. Within a population, organisms with fewer adaptations to the environment do not survive. Those that are lucky enough to have these adaptations survive and pass these "lucky genes" on to offspring. Adaptations are not something an animal chooses. They are part of one's DNA. Adaptations can be structural (i.e., physical features), or behaviors.

9. Describe three features and/or behaviors of albatross that allow them to better survive and/or reproduce, passing on their genes to future generations.

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Elaborate

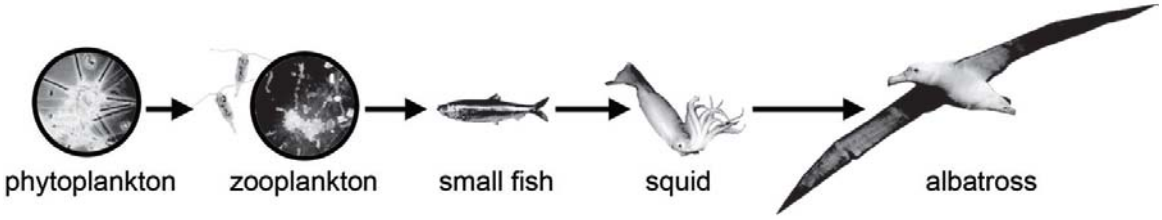
Life at the Sea Surface

The majority of living space on our *honua,* planet, is in the *kai,* ocean. The ocean is three-dimensional; living things, **organisms,** are found at its surface and at its deepest depths. Marine organisms range from tiny to huge, from microscopic organisms to the blue whale, which is the largest animal to have ever lived on earth. While most of us are more familiar with marine animals such as *manō* (sharks), *koholā* (whales), *nai'a* (dolphins), *i'a* (fish), *honu* (sea turtles), and *'ōpae* (shrimp), microscopic organisms outnumber these animals by far.

Organisms that can only be seen with microscopes are called **microbes** or microorganisms**.** In the ocean, it is microbes that support life, including those huge blue whales. Tiny plant-like microbes are called **phytoplankton.** Phytoplankton take energy from *lā,* the sun, and change it into sugar. This process is known as **photosynthesis.** On land, plants, including grasses and trees, do photosynthesis. In the ocean, it is the phytoplankton that take on this role.

Phytoplankton are eaten by animal-like organisms called **zooplankton,** which use the energy in the phytoplankton for their own life processes, including respiration and making proteins. The zooplankton are in turn eaten by animals such as krill, sponges, and corals. Other animals feed on these animals. For instance, some whales eat krill, and some sea turtles eat sponges. In this way, the energy captured by the phytoplankton is passed on to many other organisms.

It is easier to picture this transfer of energy through a diagram called a **food chain.**



Food chains are a simple way of describing this energy transfer. In real life, food chains are very complex because most animals eat several different types of food. Diagrams that show a variety of overlapping food chains are known as **food webs.**

10. What are microbes?

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Image credits: Phytoplankton: NOAA MESA Project, Zooplankton: NOAA/D.Forcucci; NOAA Central Library/Charleston Bump Expedition 2003. NOAA Office of Ocean Exploration; Dr. George Sedberry, South Carolina DNR, Principal Investigator, Fish: NOAA, NEFSC, Squid: NOAA/MBARI 2006, Albatross: NOAA Corps/Lieutenant Elizabeth Crapo

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11. Describe one reason that phytoplankton are important to albatross.

Evaluate

Draw a diagram of an albatross. In your diagram, note at least two adaptations of albatross that allow them to survive for months or years at sea.